

## CLAIMS

1           1. A process of detecting an oligonucleotide elongation, the process  
2 comprising the steps of:

- 3           (a) providing an oligonucleotide;
- 4           (b) combining a detectable moiety and the oligonucleotide to form a  
5           labeled oligonucleotide, the labeled oligonucleotide characterized  
6           by an association independent of a dual contribution covalent bond  
7           between the detectable moiety and the oligonucleotide;
- 8           (c) adding the labeled oligonucleotide to an oligonucleotide elongation  
9           mixture;
- 10           (d) initiating an elongation reaction in the oligonucleotide elongation  
11           mixture; and
- 12           (e) assaying for the labeled oligonucleotide in the oligonucleotide  
13           elongation mixture to detect the oligonucleotide elongation.

1           2. The process of claim 1 wherein the non-covalent association is  
2 selected from the group consisting of: an ionic bond, a hydrogen bond, a Van der  
3           Waals interaction and an organometallic coordinate covalent bond.

1           3. The process of claim 1 wherein the detectable moiety comprises a  
2           fluorophore.

1           4. The process of claim 1 wherein the detectable moiety comprises a  
2           metal-containing fluorescent compound.

1           5. The process of claim 4 wherein the metal-containing fluorescent  
2           compound comprises platinum.

1           6. The process of claim 4 wherein the metal-containing fluorescent  
2           compound comprises a metal selected from the group consisting of: palladium,  
3           rhodium, ruthenium, osmium, and iridium.

1           7.    The process of claim 1 wherein the elongation reaction is a  
2    polymerase chain reaction.

1           8.    The process of claim 1 wherein the elongation reaction is a reverse  
2    transcription reaction.

1           9.    The process of claim 1 wherein the elongation reaction is a primer  
2    extension reaction.

1           10.   The process of claim 1 wherein the elongation reaction is a ligase  
2    chain reaction.

1           11.   The process of claim 1 wherein the process further comprises the  
2    step of purifying the labeled oligonucleotide.

1           12.   The process of claim 1 wherein the step of assaying the labeled  
2    oligonucleotide comprises a measurement of fluorescence polarization.

1           13.   The process of claim 1 wherein the step of assaying the labeled  
2    oligonucleotide comprises a measurement of fluorescence intensity.

1           14.   The process of claim 1 wherein the step of assaying the labeled  
2    oligonucleotide comprises a measurement of fluorescence resonance energy  
3    transfer.

1           15.   A process of detecting an oligonucleotide elongation, the process  
2    comprising the steps of:

3           (a)   providing an oligonucleotide elongation reaction mixture  
4           comprising an oligonucleotide labeled with a fluorescent  
5           compound by an association independent of a dual contribution  
6           covalent bond;

7 (b) measuring a fluorescence parameter in the oligonucleotide  
8 elongation reaction mixture at a first time point to obtain a test  
9 measurement; and  
10 (c) comparing the test measurement with a reference measurement to  
11 detect the oligonucleotide elongation.

1        16. The process of claim 15 wherein the reference is a second  
2 measurement of a fluorescence parameter in the oligonucleotide reaction mixture  
3 at a second time point.

1           17. The process of claim 16 wherein the second time point is before  
2 initiation of the elongation reaction.

1           18. The process of claim 16 wherein the first and second time points  
2 are after initiation of the elongation reaction.

1                   19. The process of claim 15 wherein the reference is a measurement of  
2 a fluorescence parameter in a second oligonucleotide extension reaction mixture.

1           20. The process of claim 15 wherein the non-covalent association is  
2 selected from the group consisting of: an ionic bond, a hydrogen bond, a Van der  
3 Waals interaction and an organometallic coordinate covalent bond.

1           21. The process of claim 15 wherein the fluorescent compound is a  
2 metal-containing fluorescent compound.

1                   22.     The process of claim 21 wherein the metal-containing fluorescent  
2 compound comprises platinum

1           23. The process of claim 21 wherein the metal-containing fluorescent  
2 compound comprises a metal selected from the group consisting of: palladium,  
3 rhodium, ruthenium, osmium, and iridium.

1           24. The process of claim 15 wherein the elongation reaction is a  
2           polymerase chain reaction.

1           25. The process of claim 15 wherein the elongation reaction is a  
2           reverse transcription reaction.

1           26. The process of claim 15 wherein the elongation reaction is a primer  
2           extension reaction.

1           27. The process of claim 15 wherein the elongation reaction is a ligase  
2           chain reaction.

1           28. The process of claim 15 wherein the fluorescence parameter is  
2           selected from the group consisting of: fluorescence polarization and fluorescence  
3           intensity and fluorescence resonance energy transfer.

1           29. A process of detecting an oligonucleotide elongation, the process  
2           comprising the steps of:

- 3           (a) providing an oligonucleotide elongation reaction mixture  
4           comprising an oligonucleotide labeled with a metal-containing  
5           fluorescent compound;
- 6           (b) measuring a fluorescence parameter associated with the metal-  
7           containing fluorescent compound in the oligonucleotide elongation  
8           reaction mixture at a first time point to obtain a test measurement;  
9           and
- 10          (c) comparing the test measurement with a reference measurement to  
11          detect the oligonucleotide elongation.

1           30. The process of claim 29 wherein the metal-containing fluorescent  
2           compound comprises platinum.

1           31.    The process of claim 29 wherein the metal-containing fluorescent  
2    forms a coordinate covalent bond to label the oligonucleotide.

1           32.    The process of claim 29 wherein the metal-containing fluorescent  
2    compound comprises a metal selected from the group consisting of: palladium,  
3    rhodium, ruthenium, osmium, and iridium.

1           33.    The process of claim 29 wherein the elongation reaction mixture is  
2    a polymerase chain reaction mixture.

1           34.    The process of claim 29 wherein the fluorescence parameter is  
2    selected from the group consisting of: fluorescence polarization, fluorescence  
3    intensity and fluorescence resonance energy transfer.

1           35.    The process of claim 29 wherein the reference is a second  
2    measurement of a fluorescence parameter in the oligonucleotide reaction mixture  
3    at a second time point.

1           36.    The process of claim 35 wherein the second time point is before  
2    initiation of the elongation reaction.

1           37.    The process of claim 35 wherein the first and second time points  
2    are after initiation of the elongation reaction.

1           38.    The process of claim 29 wherein the reference is a measurement of  
2    a fluorescence parameter in a second oligonucleotide extension reaction mixture.

1           39.    A process of detecting formation of an oligonucleotide hybrid, the  
2    process comprising the steps of:

3           (a)    providing a hybridization reaction mixture comprising an  
4        oligonucleotide labeled with a metal-containing fluorescent  
5        compound;

6 (b) measuring a fluorescence parameter associated with the metal-  
7 containing fluorescent compound in the hybridization reaction  
8 mixture at a first time point to obtain a test measurement; and  
9 (c) comparing the test measurement with a reference measurement to  
10 detect the oligonucleotide hybridization.

1                   40.     The process of claim 39 wherein the metal-containing fluorescent  
2     compound comprises platinum.

1           41.    The process of claim 39 wherein the metal-containing fluorescent  
2    forms a coordinate covalent bond to label the oligonucleotide.

1           42. The process of claim 39 wherein the metal-containing fluorescent  
2 compound comprises a metal selected from the group consisting of: palladium,  
3 rhodium, ruthenium, osmium, and iridium.

1           43. The process of claim 39 wherein the reference is a second  
2 measurement of a fluorescence parameter in the oligonucleotide reaction mixture  
3 at a second time point.

1           44. The process of claim 43 wherein the second time point is before  
2 initiation of the elongation reaction.

1           45.    The process of claim 43 wherein the first and second time points  
2    are after initiation of the elongation reaction.

1           46.     The process of claim 39 wherein the reference is a measurement of  
2     a fluorescence parameter in a second oligonucleotide extension reaction mixture.

1           47. The process of claim 35 wherein the fluorescence parameter is  
2 selected from the group consisting of: fluorescence polarization, fluorescence  
3 intensity and fluorescence resonance energy transfer.

1           48.    A process for detection of changes in a nucleic acid essentially as  
2   described herein in any of the examples.

1           49.    A process for nucleic acid quantification essentially as described  
2   herein in any of the examples.

1           50.    A commercial package comprising a metal-containing fluorescent  
2   compound reaction mixture component along with instructions for use thereof to  
3   detect changes in an oligonucleotide indicative of elongation or hybridization.

1           51.    The use of a detectable moiety attached post-synthesis to an  
2   oligonucleotide for real-time detection of changes in nucleic acid elongation,  
3   amplification or hybridization.

1           52.    The use of claim 51 wherein the detectable moiety is a fluorophore.

1           53.    The use of claim 52 wherein the fluorophore is a metal-containing  
2   fluorescent compound.

1           54.    The use of claim 53 wherein the metal-containing fluorescent  
2   compound contains platinum.